

Winona State University Campus Tree Care Plan

The following Tree Care Plan is a formal statement to the WSU campus community, to the Winona community and region WSU serves, and to contractors engaged in campus projects, regarding policies, procedures and institutional goals pertaining to the care of trees on campus grounds and all allied properties.

1. **PURPOSE:** The purpose of the Winona State University Campus Tree Care Plan is to:

- Select appropriate trees, shrubs and plants that are indigenous to Southeast Minnesota. Non-native plants will be used for academic study for comparing their viability and maintenance needs with native plants. The university will avoid planting trees that are invasive or prohibited by state or federal authorities as well as those threatened by invasive predators such as the emerald ash borer.
- Promote and employ ecologically-based best practices (planting, cultivation and maintenance) within a framework of management which is adaptive. Trees, shrubs, and plants will be planted in appropriate soil as well as weighing consideration of their proximity to buildings, sidewalks, underground infrastructure, overhead wires, and other obstacles.
- Maintain the ecological integrity of the soil and support the biological diversity of its microfauna and flora.
- Maintain water quality while emphasizing conservation, including the use of alternate sources.
- Protect trees, shrubs and plants from construction, landscape maintenance, disease, and weather damage.

Foster an ethic of environmental stewardship within the WSU campus and greater Winona community.

2. **RESPONSIBLE DEPARTMENTS:** The Landscape Services and Arboretum Division (and Arboretum Director), Campus Planner, and Assistant V.P. of Facilities Services will have primary responsibility for implementing, monitoring and enforcing the Tree Care Plan. Additionally, the Arboretum Committee (including the Trees, Shrubs, and Plants Subcommittee), will have significant advisory oversight and input into the evolution and enforcement of the Tree Care Plan.

3. **CAMPUS TREE ADVISORY COMMITTEE:** The tree advisory committee is formally known as the All-University Arboretum and Land Stewardship Committee, within which functions the Trees, Shrubs and Plants Subcommittee that advises the larger committee on all tree care matters. The Trees, Shrubs and Plants Subcommittee is comprised of persons who have knowledge, experience and other expertise as Tree-Care Advisors, Master Gardeners, and arborists needed to provide oversight and advice regarding care of the campus tree collection.

The larger Arboretum Committee is comprised of WSU faculty and staff, retirees, students and community members. Members may renew their membership annually to preserve continuity on the committee and with the ongoing projects sponsored by the committee. The committee meets at least monthly to provide recommendations to the Arboretum Director and administration on campus tree-care and general landscape policy and practices.

4. CAMPUS ARBORICULTURE POLICIES AND PRACTICES:

a. Planting Trees

Tree Selection:

Successful tree planting depends on the selection of trees that are appropriate for the setting. The Trees, Shrubs, and Plants Sub-committee will provide the Arboretum Committee with sources and recommendations of trees, shrubs, and plants for planting on campus. One of the main goals is to maintain a collection of the fifty-two native trees of Minnesota, and to represent the southeastern Minnesota biomes on the campus and its allied properties. However, since the grounds are considered an extension of the campus's classrooms, other non-native tree species may also be given consideration as part of the campus tree collection. Selection of tree species will also depend on soil characteristics, exposure (sun and wind), water requirements, plant maintenance (e.g., special pruning requirements, treatment for disease and/or pests, or support), form/size of mature plant, hardiness, and appropriateness for the landscape design.

Recommended/Prohibited Species:

A list of recommended species for the WSU Arboretum will include the fifty-two trees native to Minnesota as listed by the Minnesota Department of Natural Resources (see Appendix A). There may be other non-native trees used on campus depending on location, function, and hardiness. Recommendations for selection may come from *Recommended Trees for Southeast Minnesota: An Ecosystem Approach* by Gary Johnson, UMN and Katie Himanga, Heartwood Forestry, which provides lists of recommended deciduous and coniferous trees. Another source for selecting trees and shrubs is *Trees and Shrubs of Minnesota* by Welby R. Smith which includes native as well as naturalized trees, shrubs, and vines in Minnesota. Prohibited species are those identified by the Minnesota and U. S. Departments of Agriculture, Minnesota Department of Natural Resources, and Minnesota Department of Transportation (see Appendix B).

Planting:

Prior to planting, the site must be inspected for potential underground infrastructure (gas, telephone, cable, electrical lines). Additionally, before planting, a soil test and percolation test may be desirable or necessary.

The basic steps for planting trees are as follows (for more detail, refer to references below):

1. Locate the main root system first lateral roots and trunk flare. Remove soil from top of root ball, if the tree has been balled and burlapped or has been grown in a container, until first lateral roots are exposed. Check for potential problem roots (like

stem-girdling or circling roots) and remove them. If the tree is container grown, check for circling roots (pencil-sized or larger) and remove them by sawing off sides of the root ball (boxing method).

2. Dig a hole 2 to 3 times the width of the root ball and deep enough so the trunk flare is at or 1-2 inches above grade.

3. Carefully move the tree into the prepared hole and straighten it. If balled-and-burlapped, remove wire cage and burlap as low as possible (at least top half) before backfilling with soil removed from hole. If clay soil, break up as much as possible before backfilling.

4. Backfill hole with soil removed to create the hole and tamp with foot pressure to stabilize tree.

5. Water root ball and entire backfilled area thoroughly to settle soil and remove air pockets.

6. Put a layer of 2-4 inches of mulch over backfilled area. Be sure to pull mulch away from trunk so the bark is not touched.

7. Stake the tree only if the root ball is unstable or the tree is planted bare root. Stake low, use wide nylon or canvas strips, and do not tie tightly. The tree needs to be able to move. Staking may also be used to prevent vandalism. Remove the stakes after 1-2 years.

8. Water until tree is established—minimum of three years. See Section III. Watering.

(See diagram in Appendix C).

Resources to consult for proper tree planting:

Tree Owners Manual for the Northeastern and Midwestern United States, a booklet produced by the US Department of Agriculture/Forest Service/Northeastern Area State/Private Forestry;

New Tree Planting, a brochure published by the International Society of Arboriculture;

The Minnesota Department of Transportation standards: *Inspection and Contract Administration Manual for Mn/DOT Landscape Projects*;

Watering Trees, Patrick Weicherding, PhD., Regional educator and Professor, Andover Regional Center; University of Minnesota Extension (Bulletin);

A Pocket Guide to Planting Trees, a pamphlet produced by the Minnesota Department of Natural Resources in 2014 for Arbor Day.

b. Pruning Schedule and Practices

General pruning guidelines:

Tree pruning is done for safety, health and aesthetics. It can reduce the potential damage to the tree during severe weather. Branches that could cause personal or property damage, interfere with visibility or are growing into utility lines should be removed. Insect infested and/or diseased wood should be removed. Additional reasons for pruning

include branches that cross or rub. The natural form and character of trees as well as increased flower production are also reasons for pruning.

All pruning should follow the ANSI A 300 and ISA standards for pruning.

See the *Tree Owner's Manual for NE and Midwest* for specifics on pruning procedures and equipment.

1. Pruning Schedule

- a. Young trees (<7 years old) should receive structural pruning on an annual or biennial basis
- b. Trees 7-20 years old should receive structural pruning every 2-5 years
- c. Trees older than 20 years should receive maintenance pruning every 5-7 years to clean dead, diseased dying and defective branches from the crown.
- d. Trees adjacent to sidewalks, roads, signs and streetlights should be inspected yearly for safety and clearance issues and maintenance pruned as necessary.
- e. Do not remove any more that 25 % of the trees live branches (and leaves) at any one time.
- f. Removal of broken, dead or rubbing branches can be done annually.
- g. Branches that sprout from the base of the trunk should also be removed annually.

2. Pruning practices

- a. Pruning shall not be done without a clear objective and outcome.
- b. Prune first for safety, next for health and then for aesthetics.
- c. When removing branches, the pruning cut should not damage the branch bark ridge and branch collar (see Appendix D).
- d. Internode (heading) cuts should not be used except in storm response and crown restoration procedure.
- e. Branch reduction or thinning should be used to achieve pruning objectives rather than making large (>8 inch diameter) branch removal cuts.

3. Cleaning

- a. Cleaning shall be performed to remove dead, diseased, dying and defective branches reducing hazards and promoting health and improved appearance.
- b. Ropes and rigging equipment should be used to remove large branches to minimize the risk of tree injury from falling debris.

4. Thinning

- a. The purpose of thinning is to reduce the density of branches, increasing light penetration, improving visibility and decreasing wind load.

- b. Assess how a tree will be pruned from the top down.
- c. Remove branches with weak V-shaped angles of attachment and/or included bark. Favor branches with strong u-shaped angle of attachment.
- d. Ideally, lateral branches should be evenly spaced on the main stem of young trees.
- e. Remove rubbing and crossing branches.
- f. Do not remove more than $\frac{1}{4}$ of the living crown of a tree at one time. If necessary to remove more do it over successive years.
- g. Ensure that the lateral branches are no more than $\frac{1}{2}$ to $\frac{3}{4}$ of the diameter of the main stem to deter the development of co-dominant stems.

5. Raising

- a. Raising shall be performed to provide vertical clearance from thoroughfares, sidewalks, signs, street lights and structures.
- b. Always maintain live branches on at least $\frac{2}{3}$ of a tree's total height.
- c. Removal of excessive lower branches will hinder the development of a strong main stem.
- d. Remove basal sprouts and vigorous epicormic shoots.

6. Reduction

- a. Use reduction pruning only when absolutely necessary to reduce the overall height of a tree or to decrease the length of an individual branch.
- b. Make the pruning cut at a lateral branch that is at least $\frac{1}{3}$ the diameter of the stem to be removed.
- c. If it is necessary to remove more than $\frac{1}{2}$ of the foliage from a branch, remove the entire branch.

7. Safety Measures for tree pruning

- a. If trees or branches are within 10 feet of utility lines, contact the utility company.
- b. If tree pruning cannot be done standing on the ground, hire an arborist.
- c. If power equipment is required hire an arborist.

c. Watering:

Water the tree sufficiently with 1-2 gallons of water per diameter inch of the stem. In general, daily watering is needed after planting for several weeks. Watering frequency decreases to several times per week for the next several months and eventually to weekly watering until established.

The use of gator bags placed around the base of newly planted trees can accomplish the above watering objectives quicker and more efficiently than hand labor reducing labor

costs.

Irrigation guidelines (adapted from Gilman, E.F. 1997 *Trees for Urban and Suburban Landscapes*. Delmar Publishers; and Hauer, R.J. 2000. *Tree Establishment: Water you're going to do!* Mn Shade Tree Advocate 3 (3): 5-7) for establishing trees on well drained sites; and *Watering Newly Planted Trees and Shrubs*, 2016 UMN Extension; and *Watering Established Trees and Shrubs*, 2016 UMN Extension.

- Less than 2 inch caliper transplant: Water daily for 1-2 weeks; every other day for 3-12 weeks; weekly until established.
- 2-4 inch caliper transplant: Water daily for 1-2 weeks; every 2-3 days for 3-12 weeks; weekly until established.
- 4 inch caliper transplant: Water daily for 2 weeks; every other day for 3 months; weekly until established.
- Omit daily irrigation when planting in late fall or early spring.
- Reduce frequency of watering when weather is cool, cloudy, or wet. Eliminate daily watering in poorly drained soils. After a rainfall wait until all free moisture drains from the soil.
- Establishing a tree takes 18 months (1 ½ years) per-inch of tree caliper.
- Watering can stop once deciduous trees drop leaves in the fall. Conifers may require continued late fall watering.
- A turf irrigation system may require less watering for individual trees during establishment period.
- A drip irrigation system may work best in watering trees in special situations.
- Newly planted trees can be hand watered from a spigot from the nearest building or a mobile water tank.
- An automatic sprinkler system supplies water to much of the campus. However, the system is designed to meet the water needs of turf. A soil probe will help determine if sufficient water is being supplied to newly planted trees. The automatic sprinkler system has numerous controllers or clocks linked to a rain sensor that shuts down the system in event of excessive rain.

d. Mulching

When mulching newly planted trees and shrubs, the top of the root-ball should be bare and mulching should begin at the edge of the root-ball. This practice optimizes root production, water uptake, and establishment of newly planted trees and shrubs. A layer of compost may be added over the root-ball up to the bark edge to provide a slow release of nutrients and maintain moisture within the surface root zone. Tree mulching should be done every 2 years for trees up to 6 caliper inches. Occasionally, drip lines of larger trees and tree groupings may be mulched. 3-4 inches of mulch should be placed around the tree extending out to the drip line. Care should be taken to keep the mulch approximately 12-18 inches from the trunk in more mature trees to prevent the formation of circling and

stem-girdling roots. It may be necessary to add a thicker layer of mulch (4-6 inches) around borderline-hardy trees to further protect them during the winter.

A shredded organic woody mulch such as cypress works best at WSU due to limitations of the storm sewage system. Excessive rainfalls cause manhole covers in the sewage system to blow off causing large amounts of water to spill over portions of the campus. Many plantings are temporarily under water for several hours. The shredded cypress mulch seems to stay in place better than other mulches or wood chips. In addition, the cypress mulch tends to last longer and have a more aesthetically pleasing appearance.

In certain circumstances an inorganic mulch, such as decorative rock and stone, may be an appropriate choice. Plantings on hillsides or areas having heavily traffic are possible spots requiring inorganic mulch.

e. Fertilization

Fertilize new trees during the first season only if a soil test recommends its use. An organic based product such as Sustane may provide the proper nutrients in a safe, slow released manner. The use of this product or similar products fits in with the University's guidelines for sustainable landscape practices.

- In some instances it may be decided that the regular fall turf fertilization will be sufficient.
- Trees (e.g., specimen trees) may receive tailored fertilization when severe nutrient deficiencies are detected.

f. Severe Weather Response

When trees are damaged due to severe weather (tornadoes, ice storms, etc.) the first priority is to remove blockages that disrupt campus access. Once this has been addressed an inventory of damage losses is undertaken to assess the breadth of damage. If the damage exceeds the ability of WSU to handle the removal in-house, an outside contractor can be hired for specific needs. Unsalvageable trees will be removed and replaced as budget allows, unless safety concerns dictate immediate removal. Replacement trees will be chosen from the list of preferred trees for the campus.

5. PROTECTION AND PRESERVATION POLICIES AND PROCEDURES*

*The following "Tree Protection Plan During Construction" policy has been adapted from University of Illinois in Chicago Forest Management Plan 2011. WSU Arboretum and Land Stewardship Committee approved the adapted policy on June 12, 2013, and by the WSU Cabinet of Administrators on June 24, 2013. Subsequently, selected sections with minor updates were amended and approved by the Committee on October 20, 2016.

Protection and Preservation:

The Facilities Planning and Construction office will enforce the "Tree Protection Plan During Construction Policy," and shall be contacted with any questions or items to be

clarified prior to the start of work.

Contact: Arboretum Director
Facilities Planning and Construction
Facilities Services, 203B
Phone: 507-457-2892
Email: lpearson@winona.edu
Fax: 507-457-2624

All trees should be evaluated for their potential to be preserved when located in an area planned for construction. Trees should only be removed for construction when the cost to preserve them is too significant to justify the loss of potential future benefits. Therefore, benefits such as aesthetics, energy savings, carbon and water sequestration and pollutant removal, among others should be closely weighed against the cost of preservation.

Tree removal decisions shall be made by Facilities Management (i.e., Campus Planner, Arboretum Director), with assistance from the All-University Arboretum and Land Stewardship Committee, its Trees, Shrubs and Plants Subcommittee, and other appropriate personnel as may be necessary.

All sites planned for construction where trees may be potentially impacted shall follow five steps to ensure proper tree preservation.

1. Tree Preservation Plan

A Tree Preservation Plan shall be developed for every construction site where trees may be potentially impacted by construction. Such a plan shall consist of the following:

a. Mapping the boundary of the construction zone and all trees to be potentially impacted. Trees should be placed into the following categories:

1) Not salvageable

1. Trees within the footprint of construction that must be removed to accommodate construction.
2. Trees in too poor of health prior to construction to make it likely for them to survive disturbance from construction activities.

3. Invasive Species

2) Low Priority for Protecting

1. Deciduous trees that are below 6" DBH, average 18 foot canopy width or 20 foot height, and evergreen trees 5' in height and below.
2. Trees with low value in terms of energy savings, carbon sequestration, aesthetics or pollutant removal.
3. Invasive species

3) High Priority for Protecting

1. Deciduous trees that are above 6" DBH, average 18 foot canopy width or 20 foot height, and evergreen trees above 5 feet in height.
2. Trees with a high value in terms of energy savings, carbon

sequestration, aesthetics or pollutant removal.

3. Trees that are a part of Winona State University’s Minnesota Collection.

4) Trees that are significant to WSU’s Arboretum: memorial trees, unique specimen or groupings of specimens.

b. Plan for preserving all existing trees

The methodology for preserving the health and structural integrity of all trees on the construction site must be mapped and explained in detail.

c. Rationale for removing trees

Before a decision is made to remove any trees, reasons must be provided. An effort must be made to explore preservation options for every tree before removal is considered. This includes protection for trees during construction and considering modifying the construction plan to limit tree impact.

2. Tree Protection Zones

A Tree Protection Zone (TPZ) should be established for all trees selected for preservation. A TPZ is meant to protect the tree’s limbs, trunk and roots from construction damage. To determine the TPZ fence perimeter location, the tree’s Critical Root Radius (CRR) is measured by taking the tree trunk diameter measured at a height of 4.5 feet by a factor ranging from .5’ to 1.5’ depending on the tree’s age and sensitivity to construction. A minimum of 2 foot CRR is required. See the table below adapted from Matheny Clark, 1998 and the British Standards Institute:

Critical Root Radius Table

(Trunk diameter inches at 4.5’ height x feet per inch factor)

Species Tolerance	Tree Age	CRR factor in feet
High	Young	0.50
	Mature	0.75
	Overmature	1.00
Medium	Young	0.75
	Mature	1.00
	Overmature	1.25
Low	Young	1.00
	Mature	1.25
	Overmature	1.50

Signage shall be placed on the outside of the TPZ which clearly states the purpose of the zone, with instructions to keep construction activities outside of the fencing. Fencing shall be temporary chain link sections which are gated for maintenance personnel access for watering and otherwise maintaining the tree during the construction period. It is preferred that construction materials and equipment not be leaned against fencing.

3. Pre-Construction Inspection

All trees to be protected should be inspected prior to the commencement of

construction activities and a value established for the tree by Facilities Management (Campus Arborist, and Arboretum Director) using the Council of Tree and Landscape Appraisers' valuation method (*Guide for Plant Appraisal*, CTLA) or comparable standards and methods used by an ISA Certified Arborist. Documentation, including dated photographs, should be completed detailing the state of the trees prior to construction. Inspections should be performed by a qualified Facilities Management employee (Arboretum Director, and campus arborist) and/or a member of the All-University Arboretum and Land Stewardship Committee.

4. Inspections During Construction

Trees should be inspected at least bi-weekly during construction to ensure that they are being properly preserved. Inspections should be performed by a qualified Facilities Management employee (Arboretum Director, and campus arborist) and/or a member of the All-University Arboretum and Land Stewardship Committee. A proper record should be taken of every inspection performed. Such a record should include dated photographs of trees being preserved and notes on any work being performed that might be harmful to trees within the protection zone. Construction may be stopped at any location where trees are not being preserved according to plans.

5. Post-Construction Inspection

Trees should be inspected once construction has been completed to ensure proper preservation procedures were followed throughout construction and to inspect the overall health and appearance of trees. If any damage or potential concerns are noted, proper action must be taken to ensure tree health and safety and determine liability.

6. Trenching and excavation relating to construction methods in or around the Critical Root Zone (CRZ):

If utility or irrigation lines cannot be located or relocated outside the CRZ, then to reduce root damage, the following practices should be followed:

a. Tunnel or bore rather than trench whenever possible. Because most roots grow in the top 18 inches of soil, a tunnel made 2 feet underground usually does little damage to roots. Boring 3-4 feet would be even safer. It is also recommended to tunnel 1-2 feet away from the center of the tree to avoid a taproot. Also, limit trenching to one side of a tree and do not cross the CRZ.

b. When tunneling is not feasible, hand digging or using an "air spade" will be required to preserve roots $\frac{3}{4}$ inch or greater in diameter. For all digging operations, exposed roots that are cut or damaged need to be cut cleanly to promote quick wound closure and regeneration. Vibratory plows, chain trenchers, stump grinders, and hand tools do a better job than bulldozers and backhoes.

c. Whenever possible route underground utilities around the CRZ and contain all utilities in one common tunnel rather than having separate tunnels for each utility. Avoid excavation during hot, dry weather. Be sure plants and trees in the construction area are well watered before and after digging and exposed roots are covered with soil, mulch, or damp burlap as soon as possible.

7. Tree Damage Assessment:

Assessment of tree damage caused by any contractor will be the responsibility of Facilities Management (campus arborist, Arboretum Director), with assistance from the All-University Arboretum and Land Stewardship Committee. Assessment will include determination of the cause of damage and appropriate remedies to return the damaged tree to health, if possible. Any contractor found to be responsible for damage to trees during construction or other activity shall be held liable. They will be required to fund the replacement cost of any trees lost, or to fund the cost to repair damage to any trees that can be saved. Replacement cost shall be determined prior to construction using the valuation method established by the Council for Tree and Landscape Appraisers (CTLA). Any individual or entity wishing to appeal a tree damage penalty may request a meeting with Facilities Management (Ass't. V.P. of Facilities Services, Campus Planner, Arboretum Director) and Vice-President of Finance and Administrative Services, where they can explain why they should not be held liable.

6. GOALS AND TARGETS

Winona State University is a signatory to the Campus Climate Compact, which seeks to reduce global warming and pollution through environmentally friendly and sustainable campus practices. As a university that seeks to improve our world through both education and demonstration, it is believed that educating about and exhibiting a properly maintained campus forest can contribute to improving the local as well as global climate. Two key goals of the campus arboretum's strategic plan, to be developed by the Arboretum Committee, will be first to continue with the restoration of the campus grounds, and second to provide education and outreach to students and the community regarding tree and plant care. A third goal is to collaborate with the campus Sustainability Committee and student Environmental Club to enhance the promotion of and institutional support for becoming a more bike-friendly campus as a means of reducing traffic congestion, parking problems and lowering the campus' carbon footprint.

The first goal is to continue with the restoration of the campus grounds. This will involve continuing the maintenance (pruning and removal) of trees on a small area of the East campus, replanting trees to maintain the diversity of tree species and the collection of campus trees native to Minnesota, and constructing and refurbishing (i.e., redesigning, replanting) selected campus gardens emphasizing a transition to plants and trees native to the southeastern Minnesota biome, State of Minnesota, and the Upper Midwest. This restoration work is a continuing project from the previous year.

The second goal is to offer outreach opportunities and education to the students and the community regarding tree and plant care. The target here will be to establish seminars, workshops, and short-courses about tree and plant care, sustainable landscape practices and permaculture design, among others, that will be open to the campus community and public within the region and beyond. Possible topics could be proper planting techniques, pruning, gardening for pollinators, Aldo Leopold's Land Ethic training, etc. Tree and gardens tours would be offered and people introduced to the WSU computer app that has information about various trees on campus. The ongoing effort to label campus trees will also contribute to educating both students and the community. The

annual Arbor Day celebration on campus will involve a variety of educational activities for students and the community to learn about aspects of the campus forest. Developing outreach education opportunities is an annual goal of the Landscape Arboretum at WSU.

The third goal is to collaborate with the campus Sustainability Committee and Environmental Club to establish the WSU campus as more bike friendly. Currently our campus is working on sustainability in many areas, and encourages students, faculty and staff to bike to campus, by supporting a campus bike repair project. A "Bicycle Task Force Report" was submitted in November, 2015, but has not been acted upon to date. This remains, therefore, a goal of the campus arboretum committee going forward. The Report provided direction for the development of new bike initiatives on campus, including new regulations governing bicycles on campus, a year-around bike repair station, additional secure weather-protected bike racks and storage options across campus, and safe-routes within the City of Winona and the campus for bikers and pedestrians alike. These initiatives, in turn, will have an impact on protecting trees, other campus vegetation and campus structures from inappropriate bicycle practices (e.g., chaining bikes to trees, buildings, ramps, etc.). Additionally, a more bicycle-friendly campus can help promote biking as an alternative means for reducing campus traffic congestion and, indirectly, the campus's carbon footprint if reliance on automobile use is curtailed.

7. TREE DAMAGE ASSESSMENT

(Please see Standard 2, number 5, "Protection and Preservation Policies", Item 7, "Tree Damage Assessment" above)

8. PROHIBITED/RESTRICTED PRACTICES (Approved by All University Arboretum and Land Stewardship Committee 10/15/2015)

As living, growing things trees are particularly sensitive to damage. The following practices must be avoided to protect trees and promote uninterrupted growth.

1. Pruning practices as noted
 - a. Topping, pollarding, or "hat-racking" unless used as an emergency measure to ensure safety of pedestrians. See Tree Topping, Appendix D.
2. Activities that will compact the root zone or cause destruction of bark.
 - a. Permanent attachment of signage to trees is prohibited.
 - b. Temporary signs should remain up for a limited time (class project-remove by end of the semester; club project-remove by end of month; if in doubt check with Arboretum Director or Land Steward)
 - c. Temporary signage should be affixed in the following manner:
 - i. By hanging light cardboard from cotton string loosely tied to a branch.
 - ii. By tacking with small push pin into the outer bark.

- iii. By taping with removable painters tape or masking tape.
 - d. Other items hanging in trees.
 - i. Bird feeders, pollen collection boxes, etc. should be hung with a protective covering on the wire or branch so that no bark damage occurs.
 - ii. Hang these items from branches large enough to support the weight without bending.
 - iii. Remove in a reasonable amount of time (class project-by the end of the semester; club project-by the end of the month; if in doubt check with Arboretum Director or Land Steward).
 - e. Use of hammocks or other roping.
 - i. Use tree protection pads to prevent damage to the bark (may be purchased on line or made from a yoga mat or comparable material).
 - ii. Only attach to trunks of trees larger than 10 inches in diameter that have rough bark (avoid smooth barked trees like birch, beech, and some maples or the like).
 - f. Slack-lining.
 - i. May be done only under supervision of Outdoor Education and Recreation Center personnel.
 - ii. Limited to 12 inch or larger diameter, rough barked trees.
 - iii. Tree protection pads must be used between the tree and line.
 - g. Chaining of bicycles, mopeds or other vehicles to trees or shrubs.

9. DEFINITIONS OF TERMINOLOGY RELATED TO CAMPUS TREES:

Bark	-the outer covering of a tree trunk and branches
Branch Collar connecting	-the area where tree stem tissues and branch tissues overlap, the branch to the stem
Caliper Inch above the inches and at 12 inches for this measure is used for nursery stock	-(stem caliper) the diameter of a tree trunk measured 6 inches ground for trees less than or equal to 4 stems greater than 4 inches;
Chlorophyll	-the green pigment found in tissues of plants and trees
Chlorosis chlorophyll, mineral deficiency or	-abnormal plant condition resulting from a deficiency of usually caused by lack of adequate light, genetic disorder

Compaction pore often eroded	-soil particles pressed together often by heavy machinery reducing space: typical of soils poor in humus, which are
Cone	-conical fruit most often associated with pine trees, and usually consisting of overlapping scales arranged around a central axis and containing a seed.
Conifer needle-like	-a tree or shrub that bears cone fruits, usually evergreen with leaves
Critical Root Zone to radius of .75 to 1.5 depending on the age and	-the minimum area surrounding a tree that is considered essential support the viability of the tree and is equal to a foot per inch of trunk diameter (DBH) type of tree.
Deciduous for part	-a tree that drops its leaves, usually annually, and remains leafless of the year; not evergreen
DBH diameter	-acronym for diameter at breast height which is the standard place of measurement, 4.5 feet, for a tree stem's
Evergreen	-tree leaves that remain green year around
Fruit seeds, as in	-the fully developed ovary of a flower containing one or more a berry, pome or nut
Hardiness heat and	-a plant's ability to withstand weather extremes such as summer dryness or winter cold
Internodal Pruning branch	-cuts made between branch unions or buds which may lead to dieback
Native humans	-a plant or tree that occurs naturally in an area; not introduced by
Naturalized place of successfully	-plant or tree that has been established in an area other than its origin and continues to reproduce there
Needle	-the long narrow leaves of conifer trees
Node	-the point on a stem where leaves or branches are attached
Nut	-dry, one-celled fruit that does not split along a natural grooved line, usually hard or boney
Pollen	-the fine, dust-like mass of grains that contain male sexual cells
Pome	-fruit with fleshy outer tissue and containing seeds
Pruning tool	-the removal of any portion of a tree though the use of a cutting
Root Ball aid in	-the collection of soil and roots of a tree that has been packaged to the transportation of the tree

Species through reproductively isolated from	-a particular population of plants or animals that reproduces breeding with each other, and that is other populations
Specimen	-an individual plant of a particular species
Topping	-internodal pruning at the top portion of a tree canopy
Tree Protection Plan for a particular site compliance with the types of trees and their reforestations	-a map and supporting documentation which describes for a where existing trees are to be retained in requirements of the regulations, the corresponding tree for
Tree Protection Zone	-the area surrounding a preserved or planted tree that is essential to the tree's health and survival, and is protected within these regulations
Trunk	-the major woody stem of a tree

10. COMMUNICATION STRATEGY:

Communication about the campus tree care plan to the campus community and contractors will take several forms. Specifically, communication will occur through:

- On-campus media: the Facilities Services website (Landscape Services and Arboretum tab, Campus Planning tab), campus email, Arboretum Committee website, and through university publications and notices.
- The WSU Campus Planning Office as well as the campus Arboretum Director will publicize and explain the tree care plan to potential campus contractors during the bidding process.
- Copies of the tree care plan will be provided to student organizations on campus.
- Providing pre- and in-service training to WSU students who wish to be employed, during the summer and academic year, within the WSU Landscape Services and Arboretum Division of Facilities Services.
- Information will be provided to students through relevant classes on campus.
- Arbor Day program, which is organized annually, every April on the WSU campus.

Local media (TV, newspapers, radio stations) within the community and at WSU will also assist in providing visibility to the activities and programs about the tree care plan.

Date campus tree care plan established: **November 19, 2014 (with subsequent amendments)**

Attach plan. (Included here)

RESOURCES CONSULTED FOR STANDARD 2:

The Trees of Winona State University, Bill Meyer and Tom Grier, Winona State University, 2004.

Campus of Trees Winona State University, Bill Meyer and Tom Grier, Winona State University, 2010.

Recommended Trees for Southeast Minnesota: An Ecosystem Approach, Gary R. Johnson, UMN Extension Service, Urban and Community Forestry and Katie M. Himanga, Heartwood Forestry; University of Minnesota Extension

Planting and Transplanting Trees and Shrubs, Jeffrey H. Gillman, Nursery Management Specialist, Department of Horticultural Science and Gary R. Johnson, Urban Forester, Department of Forest Resources; University of Minnesota Extension

Trees For All Seasons: Minnesota's Native Trees, Minnesota Department of Natural Resources, list of Minnesota's native trees.

Trees and Shrubs of Minnesota, Welby R. Smith, University of Minnesota Press, 2008, source of information about trees and shrubs that are native and naturalized in Minnesota.

Trees of Minnesota, Minnesota Department of Natural Resources, Division of Forestry, 1997, source of information about Minnesota native trees.

Minnesota Trees, David M. Rathke, University of Minnesota Extension Service, 1995, source of information and Identification key for Minnesota native trees.

Minnesota Invasive Non-native Terrestrial Plants: an identification guide for resource managers, Department of Natural Resources, Trails and Waterways, 2002; source for identification of and information about non-native terrestrial plants.

Minnesota Noxious Weeds, compiled by Dave Hanson, edited by Ken Graeve and Tina Markeson, Minnesota Department of Transportation, 2013, source for identification of, information about, and methods of dealing with noxious weeds in Minnesota.

Planting New Trees, International Society of Arboriculture, 2011, flyer from Trees Are Good organization with a nine step approach to successful planting of trees.

Tree Owner's Manual for the Northeastern and Midwestern United States, Jill R. Johnson, Gary R. Johnson, Maureen H. McDonough, Lisa Burban, and Janette K. Monear, United States Department of Agriculture, November, 2008; "Pre-Installation, Installation, and Maintenance Schedule," pages 4-12.

Inspection and Contract Administration Manual for MN/DOT Landscape Projects, Scott D. Bradley, Minnesota Department of Transportation, January 20, 2009; "Initial Planting Operations," pages 4-1 to 4-31 (gives standards for accepting plant materials)

Tree Campus Plans from Georgia Tech, Virginia Tech, University of Wisconsin—Stevens Point, and University of Illinois—Chicago, and Hennepin Technical College.

A Pocket Guide to Planting Trees, 2014, State of Minnesota, Department of Natural Resources, funded by USDA Forest Service.

Watering Newly Planted Trees and Shrubs, 2016, University of Minnesota Extension, part of the Water Wisely Program.

Watering Established Trees and Shrubs, 2016, University of Minnesota Extension, part of the Water Wisely Program.

Appendix A

Minnesota Native Trees

Deciduous-

- American basswood, *Tilia americana*
- American elm, *Ulmus americana*
- American hornbeam (blue beech), *Carpinus caroliniana*
- American mountain ash, *Sorbus americana*
- Balsam poplar (balm-of-gilead), *Populus balsamifera*,
- Bigtooth aspen (largetooth aspen, poplar, popple), *Populus grandidentata*
- Bitternut hickory, *Carya cordiformis*
- Black ash, *Fraxinus nigra*
- Black cherry, *Prunus serotina*
- Black maple, *Acer nigrum*
- Black oak, *Quercus velutina*
- Black walnut, *Juglans nigra*
- Box elder, *Acer negundo*
- Bur oak, *Quercus macrocarpa*
- Butternut, *Juglans cinerea*
- Chinkapin oak (yellow chestnut oak), *Quercus muehlenbergii*
- Eastern cottonwood, *Populus deltoides*
- Eastern hophornbeam (ironwood), *Ostrya virginiana*
- Green ash (red ash), *Fraxinus pennsylvanica*
- Hackberry, *Celtis*
- Honeylocust, *Gleditsia triacanthos*,
- Kentucky coffeetree, *Gymnocladus dioicus*
- Mountain maple, *Acer spicatum*
- Northern mountain ash (showy mountain ash), *Sorbus decora*
- Northern pin oak (Jack oak, Hill oak), *Quercus ellipsoidalis*
- Northern red oak, *Quercus rubra*
- Paper birch, *Betula papyrifera*
- Pin cherry, *Prunus pensylvanica*
- Quaking aspen (trembling aspen, poplar, popple), *Populus tremuloides*
- Red maple, *Acer rubrum*
- Red mulberry, *Morus rubra*

- River birch, *Betula nigra*
- Rock elm, *Ulmus thomasi*
- Shagbark hickory, *Carya ovata*
- Silver maple, *Acer saccharinum*
- Slippery elm (red elm), *Ulmus rubra*
- Sugar maple, *Acer saccharum*
- Swamp white oak, *Quercus bicolor*
- White ash, *Fraxinus americana*
- White oak, *Quercus alba*
- Willow, *Salix*
- Yellow Birch, *Betula alleghaniensis*

Coniferous-

- Balsam fir, *Abies balsamea*
- Black spruce, *Picea mariana*
- Eastern hemlock, *Tsuga canadensis*
- Eastern red cedar (juniper), *Juniperus virginiana*
- Eastern white pine, *Pinus strobus*
- Jack pine, *Pinus banksiana*
- Northern white cedar, *Thuja occidentalis*
- Red pine (Norway pine), *Pinus resinosa*
- Tamarack (eastern or American larch), *Larix laricina*
- White spruce, *Picea glauca*

Appendix B

Prohibited Trees and Shrubs:

Amur maple, *Acer ginnala*
Norway maple, *Acer platanoides*
Japanese barberry, *Berberis thunbergii*
Siberian peashrub, *Caragana arborescens*
Russian olive, *Elaragnus angustifolia*
Exotic honeysuckles, *Lonicera tartarica*, *Lonicera morrowii*, *Lonicera x bella*
Common buckthorn, *Rhamnus cathartica*
Glossy or alder buckthorn, *Rhamnus frangula*
Black locust, *Robinia pseudoacacia*
Siberian elm, *Ulmus pumila*
Multiflora rose, *Rosa multiflora* Thunb.

From: *Minnesota Invasive Non-native Terrestrial Plants*, DNR, 2002 and *Minnesota Noxious Weeds*, MNDOT, 2013

Also added to prohibited trees and shrubs would be any ash varieties until the emerald ash borer problem is eliminated or has subsided.

Minnesota Noxious Weeds (Woody Plants):

Oriental Bittersweet—*Celastrus orbiculatus* Thunb.
Glossy Buckthorn—*Frangula alnus* Mill.
Common Buckthorn—*Rhamnus cathartica* L.
Multiflora Rose—*Rosa multiflora* Thunb.
Poison Ivy-western—*Toxicodendron rydbergii* (Small) Green
Poison Ivy-eastern—*Toxicodendron radicans* (L.) Kentze subsp. Negundo (Greene) Gillis

Source: *Minnesota Noxious Weeds*, Minnesota Department of Transportation, 2013

Appendix C

INTERNATIONAL SOCIETY OF ARBORICULTURE

INTERNATIONAL SOCIETY OF ARBORICULTURE
1400 WEST ANTHONY DRIVE
CHAMPAIGN, IL 61821
(217) 355-9411
(217) 355-9516 FAX

DO NOT HEAVILY PRUNE THE TREE AT PLANTING. PRUNE ONLY CROSSOVER LIMBS, CO-DOMINANT LEADERS, AND BROKEN OR DEAD BRANCHES. SOME INTERIOR TWIGS AND LATERAL BRANCHES MAY BE PRUNED; HOWEVER, DO NOT REMOVE THE TERMINAL BUDS OF BRANCHES THAT EXTEND TO THE EDGE OF THE CROWN.

STAKE TREES ONLY UPON THE APPROVAL OF THE LANDSCAPE ARCHITECT. SEE STAKING DETAIL.

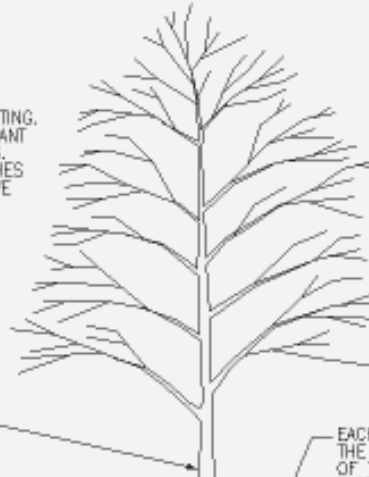
WRAP TREE TRUNKS ONLY UPON THE APPROVAL OF THE LANDSCAPE ARCHITECT. SEE WRAPPING DETAIL.

MARK THE NORTH SIDE OF THE TREE IN THE NURSERY, AND ROTATE TREE TO FACE NORTH AT THE SITE WHEN EVER POSSIBLE.

SET TOP OF ROOT BALL FLUSH TO GRADE OR 25-50 MM (1-2 IN.) HIGHER IN SLOWLY DRAINING SOILS.

50 MM (2 IN.) MULCH. DO NOT PLACE MULCH IN CONTACT WITH TREE TRUNK. MAINTAIN THE MULCH WEED-FREE FOR A MINIMUM OF THREE YEARS AFTER PLANTING.

NOTE: FOR DIMENSIONS OF PLANTING AREAS, TYPES OF SOIL AMENDMENTS, OR SOIL REPLACEMENT, SEE "SOIL IMPROVEMENT DETAILS."



EACH TREE MUST BE PLANTED SUCH THAT THE TRUNK FLARE IS VISIBLE AT THE TOP OF THE ROOT BALL. TREES WHERE THE TRUNK FLARE IS NOT VISIBLE SHALL BE REJECTED. DO NOT COVER THE TOP OF THE ROOT BALL WITH SOIL.

MULCH RING
1800 MM (6 FT.) DIAM. MIN.
2400 MM (8 FT.) DIAM. PREFERRED

200 MM (8 IN.)

100 MM (4 IN.) HIGH EARTH SAUCER BEYOND EDGE OF ROOT BALL.

REMOVE ALL TWINE, ROPE AND WIRE, AND BURLAP FROM TOP HALF OF ROOT BALL.

IF PLANT IS SHIPPED WITH A WIRE BASKET AROUND THE ROOT BALL, CUT THE WIRE BASKET IN FOUR PLACES AND FOLD DOWN 200 MM (8 IN.) INTO PLANTING HOLE.

PLACE ROOT BALL ON UNEXCAVATED OR TAMPED SOIL.

TAMP SOIL AROUND ROOT BALL BASE FIRMLY WITH FOOT PRESSURE SO THAT ROOT BALL DOES NOT SHIFT.

NOTES

- PLEASE REFER TO INTRODUCTION AND USE CRITERIA PRIOR TO USING THIS DETAIL.



TREE PLANTING DETAIL - B&B TREES IN ALL SOIL TYPES

NOTE: THIS DETAIL ASSUMES THAT THE PLANTING SPACE IS LARGER THAN 2400 MM (8 FT.) SQUARE, OPEN TO THE SKY, AND NOT COVERED BY ANY PAVING OR GRATING.

Appendix D

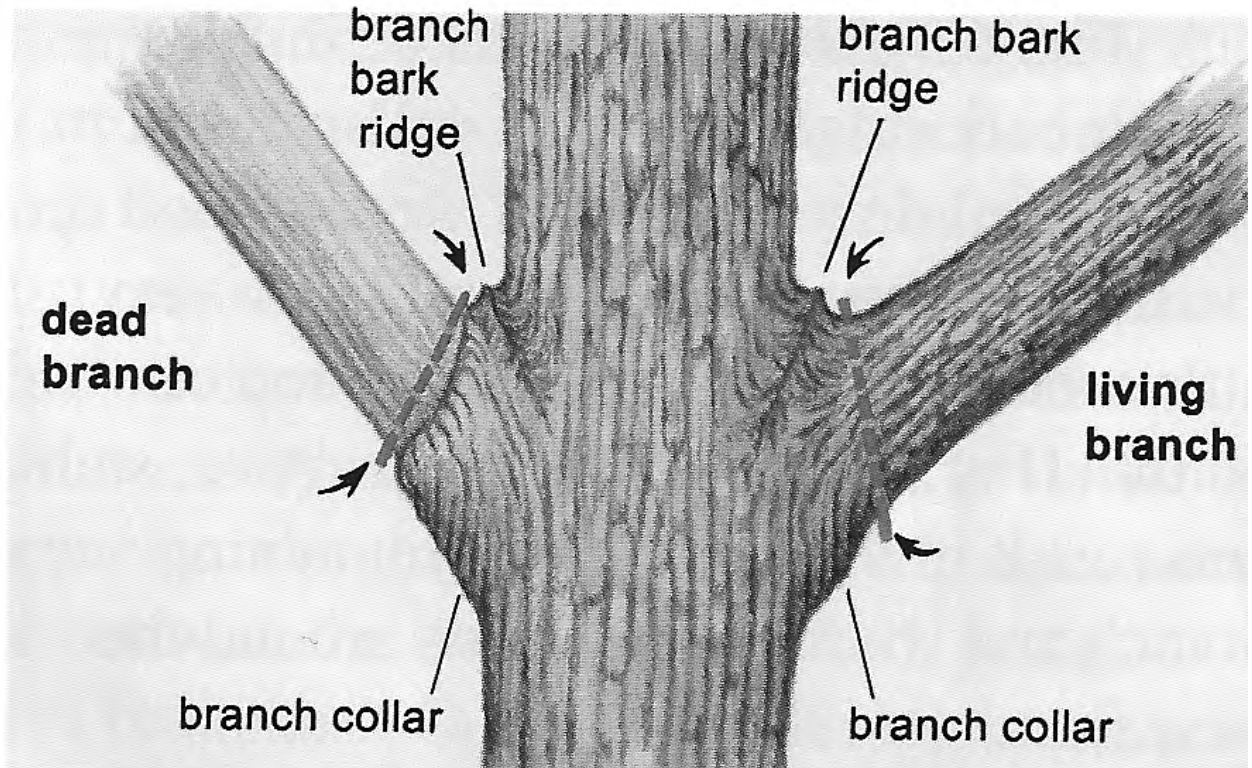


Illustration by Julie Janke from *How to Prune Trees*, by Peter J. Bedker, Joseph G. O'Brien, and Manfred E. Mielke. NA-FR-01-95 (rev. 2012). U.S. Department of Agriculture, Forest Service, Northeastern Area State and Private Forestry, Newtown Square, PA.